

## **AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions and listings of claims in the application:

1-27. (Cancelled)

28. (Currently Amended) An apparatus ~~A process~~ for controlling blood flow in an extracorporeal blood circuit, wherein said extracorporeal blood circuit has at least one blood treatment unit, at least one access branch extending between a blood collection area, where blood is collected from a patient, and the at least one blood treatment unit, at least one peristaltic pump associated for operation with said access branch of the extracorporeal blood circuit, and at least one return branch extending between the at least one blood treatment unit and a blood return area, where the blood is returned to the patient, said equipment ~~process~~ comprising the steps of:

at least a first sensor means for measuring an arterial pressure in a portion of said at least one access branch upstream of the at least one peristaltic pump and for generating a corresponding first output signal proportional to said arterial pressure;

at least a second sensor means for measuring an angular velocity of the at least one peristaltic pump and for generating a corresponding second output signal proportional to the angular velocity of said at least one peristaltic pump;

a memory means for storing ~~in a memory~~ at least one set flow value of a desired blood flow through said access branch, ~~said~~ measured values of arterial pressure and angular velocity, and a calibration function in accordance with at least the following variables:

v1, related to the angular velocity of the pump;

v2, related to the arterial pressure in the portion of said at least one access branch upstream of the at least one peristaltic pump; and

v3, related to an actual flow of blood through said at least one access branch; and

at least one control unit, operatively coupled to said first and second sensor means for receiving said first and second output signals and for storing corresponding measured values of arterial pressure and angular velocity in said memory means, said control unit including means for sequentially executing a control procedure, the means for sequentially executing the control procedure comprising the following sequential operations:

means for calculating an actual flow value by applying said calibration function to the corresponding measured values of arterial pressure and angular velocity;

means for comparing said actual flow value with said at least one set flow value; and

means for comparing the angular velocity with an acceptable maximum angular velocity value which can be imparted to the at least one peristaltic pump; and

means for varying the angular velocity of said at least one peristaltic pump if the difference between the actual flow and the desired blood flow lies outside a predetermined range.

29. (Currently Amended) An apparatus A-process according to claim 28, further comprising the step of wherein the control unit is provided with a timer means for executing said control procedure at predetermined time intervals.

30-32. (Cancelled)

33. (Currently Amended) An apparatus A-process according to claim 28, wherein said means for sequentially executing the control procedure further comprises ~~a step of~~ means for verifying a stability of said arterial pressure.

34. (Currently Amended) An apparatus A-process according to claim 33, wherein the ~~step of~~ means for verifying a stability of said arterial pressure further comprises the steps of:

means for measuring a first arterial pressure at a predetermined time,  
means for measuring a second arterial pressure after said predetermined time, and  
means for comparing a difference between the first and second arterial pressures with a predetermined range of acceptability,  
means for waiting for a predetermined time interval, and  
means for repeating said steps of measuring and said step of comparing, and continuing said control procedure if the difference between the first and second arterial pressures lies within said predetermined range of acceptability a measurement of a first arterial pressure and a second arterial pressure and for comparing a difference between the repeated measurement of the first and second arterial pressures.

35. (Currently Amended) An apparatus according to claim 33, wherein said ~~step of~~ means for sequentially executing the control procedure is for controlling said means for verifying a stability of the arterial pressure to verify said arterial pressure stability is executed before said ~~step of~~ means for calculating an actual flow calculates the actual blood flow.

36. (Cancelled)

37. (Currently Amended) An apparatus according to claim 28, wherein, ~~after said step of comparing said actual flow value with said set flow value, and before said step of varying the angular velocity of said at least one peristaltic pump,~~ said means for sequentially executing the control procedure including a step of includes a means for comparing the arterial pressure with a threshold value considered critical for a patient being treated, and, ~~if the arterial pressure is below the threshold value, an exit is made from an algorithm and~~ means for generating an operator ~~is alerted by means of a~~ warning message relating to an occurrence of a limit pressure condition if the arterial pressure is below the threshold value.

38. (Cancelled)

39. (Currently Amended) An apparatus ~~A process~~ according to claim 28, wherein the calibration function is comprises the following further based upon variable:

~~variable~~ v4, related to a time elapsed from a start condition of said control procedure,

said ~~process~~ control unit further comprising ~~a step of~~ a means for determining a time elapsed between said start condition and each instant in which said control procedure is executed, and of means for calculating an actual flow value by applying said calibration function to a value of said time elapsed and to the corresponding measured values of arterial pressure and angular velocity.

40. (Currently Amended) An apparatus ~~A process~~ according to claim 28, wherein

$$v3 = \left[ \sum_{i=0..n} a_i \cdot (v2)^{n-1} \cdot (v1)^i \right] + C,$$

where  $a_i$  and C are experimentally determined known parameters.

41. (Currently Amended) An apparatus A-process according to claim 39,  
 wherein 
$$v3 = \left[ \sum_{i=0..n} \sum_{k=0..m} a_i \cdot b_k \cdot (v2)^{n-i-k} \cdot (v1)^i \cdot (v4)^k \right] + C,$$
  
 where  $a_i$ ,  $b_k$  and  $C$  are experimentally determined known parameters.

42. (Currently Amended) An apparatus A-process according to claim 40,  
 wherein

$$v3 = a \cdot v1 + b \cdot v1 \cdot v2 + c \cdot v2 + d,$$

where  $a$ ,  $b$ ,  $c$ , and  $d$  are experimentally determined known parameters.

43. (Currently Amended) An apparatus A-process according to claim 41,  
 wherein

$$v3 = (a \cdot v1 + b \cdot v1 \cdot v2 + c \cdot v2 + d) \cdot f(v4),$$

where  $a$ ,  $b$ ,  $c$ , and  $d$  are experimentally determined known parameters and  $f(v4)$  is a function which is also known and experimentally determined in a variable  $v4$ .

44. (Currently Amended) An apparatus A-process according to claim 28,  
wherein said memory means further comprising the step of storing stores a plurality of calibration functions, each calibration function being based upon at least variables  $v1$ ,  $v2$ , and  $v3$ , and each calibration function being applicable to a corresponding one of a plurality of types of extracorporeal circuits.

45. (Currently Amended) An apparatus A-process according to claim 44,  
 wherein each of said calibration functions ~~is also a function of a~~ comprises the further variable  $v4$ , related to a time elapsed from a start condition of said control procedure.

46. (Currently Amended) An apparatus A-process according to claim 45,  
 wherein each of said calibration functions ~~is further a function of~~ comprises the further variables:

v5, related to geometrical characteristics of an access member connectable for operation to said extracorporeal blood circuit; and

v6, related to a length of a portion of a tube of the at least one access branch upstream of said at least one peristaltic pump.

47. (Currently Amended) An apparatus A~~process~~ according to claim 46, wherein said calibration function comprises two functions linked together with continuity, the first function being valid in a first range of values of arterial pressure, and the second function being valid in a second range of values of arterial pressure following said first range.

48-54. (Cancelled)

55. (New) An apparatus according to claim 28, further comprising a user interface means for sending to the control unit at least one signal activating said control procedure and at least one signal disabling said control procedure.

56. (New) An apparatus according to claim 28, wherein the control unit comprises a programmed CPU.

57. (New) An apparatus according to claim 56, wherein the means for sequentially executing a control procedure comprises a software program means programming said CPU, said software program means being stored in said memory means and being executed by the CPU.

58. (New) A blood treatment machine comprising the equipment for controlling blood flow according to claim 28.

59. (New) A blood treatment machine comprising the equipment for controlling blood flow according to claim 35.

60. (New) A blood treatment machine comprising the equipment for controlling blood flow according to claim 39.

61. (New) A blood treatment machine comprising the equipment for controlling blood flow according to claim 46.

62. (New) A blood treatment machine comprising the equipment for controlling blood flow according to claim 57.